

U.S. Serial No. 10/672,347 (Attorney Dkt: LIDO:003D1)
Art Unit: 1711

IN THE CLAIMS:

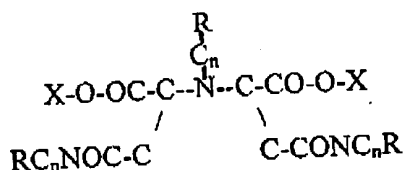
Please amend claims 12-14, 16-18, 20-22, and 24-26 to read as follows:

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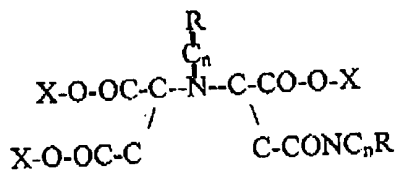
I claim:

1. (Canceled).
2. (Previously presented) A chelating composition in combination with fertilizer or fertilizer additives, said chelating composition comprising a modified iminodisuccinic acid, or a salt thereof, having one or more of the following formulas:

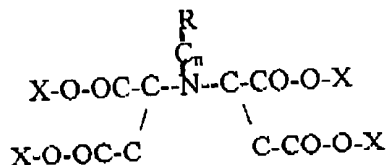
(a)



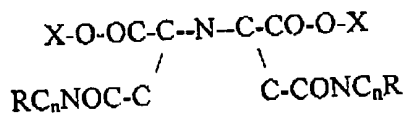
(b)



(c)

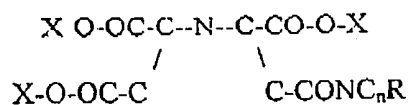


(d)



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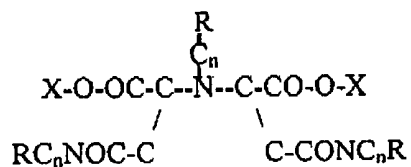
(e)



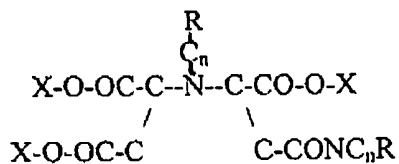
where X may be H, alkali, alkaline earth, ammonium-substituted radical,
 ammonium or transition metal;
 where n may be 1 to 10; and
 where R may be a Lewis base capable of donating a nonbonded pair of electrons.

3. (Previously presented) A fertilizer comprising a chelating composition for application to soils, seeds or plants, said chelating composition comprising a modified iminodisuccinic acid, or a salt thereof, having one or more of the following formulas:

(a)

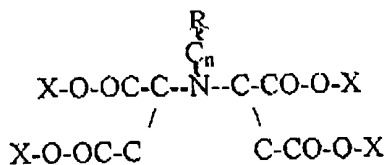


(b)

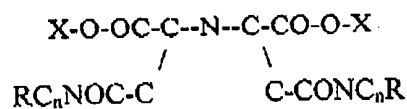


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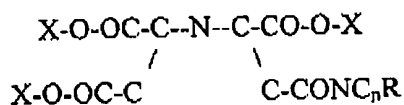
(c)



(d)



(e)

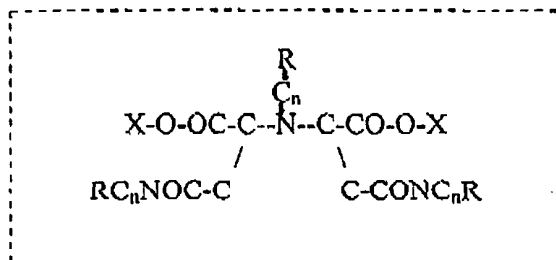


where X may be H, alkali, alkaline earth, ammonium-substituted radical,
 ammonium or transition metal;
 where n may be 1 to 10; and
 where R may be a Lewis base capable of donating a nonbonded pair of electrons.

4. (Canceled).
5. (Canceled).
6. (Canceled).
7. (Canceled).
8. (Canceled).
9. (Canceled).
10. (Canceled).

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11. (Canceled).
12. (Currently Amended) A compound used as a fertilizer additive comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:



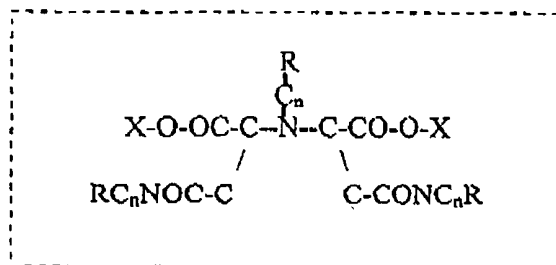
where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal; n is 1 to 10, and R is a Lewis base capable of donating a nonbonded pair of electrons, wherein said compound is synthesized by a synthesis comprising the steps of:

- (a) adding an acid anhydride or lactone to a first polyfunctional amine, and allowing same to react to form a N-polyfunctional acid common name amide; and
- (b) adding water, $\text{Me}(\text{OH})$, alkali metal hydroxide, and a second polyfunctional amine to said N- polyfunctional acid common name amide and allowing same to react to form an imino di N- polyfunctional acid common name amide.

13. (Currently amended) A compound used as a chelating agent in a concentration of $1/10^a$ to 1 part, where a is less than 10, or 1.0×10^{-9} Molar to 3Molar, wherein

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said compound comprises at least one poly functional substitution on iminodisuccinic acid having the following formula:

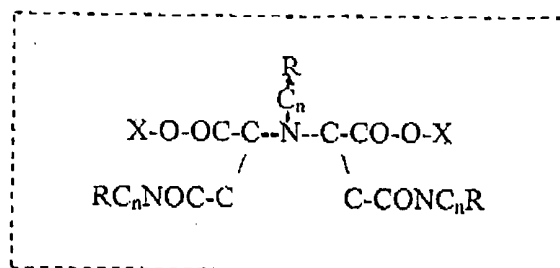


where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal; n is 1 to 10, and R is a Lewis base capable of donating a nonbonded pair of electrons, and wherein said compound is synthesized by a synthesis comprising the steps of:

- (a) adding an acid anhydride or lactone to a first polyfunctional amine, and allowing same to react to form a N-polyfunctional acid common name amide; and
- (b) adding water, ~~Me(OH)~~, alkali metal hydroxide, and a second polyfunctional amine to said N-polyfunctional acid common name amide and allowing same to react to form an imino di N- polyfunctional acid common name amide.

14. (Currently amended) A compound used for application to soils, seed, or plants, wherein said compound comprises at least one poly functional substitution on iminodisuccinic acid having the following formula:

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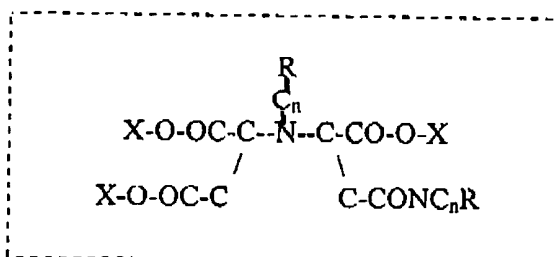


where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal; n is 1 to 10, and R is a Lewis base capable of donating a nonbonded pair of electrons, and wherein said compound is synthesized by a synthesis comprising the steps of:

- (a) adding an acid anhydride or lactone to a first polyfunctional amine, and allowing same to react to form a N-polyfunctional acid common name amide; and
- (b) adding water, ~~Me(OH)~~, alkali metal hydroxide, and a second polyfunctional amine to said N- polyfunctional acid common name amide and allowing same to react to form an imino di N- polyfunctional acid common name amide.

15. (Canceled).

16. (Currently amended) A compound used as a fertilizer additive comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:

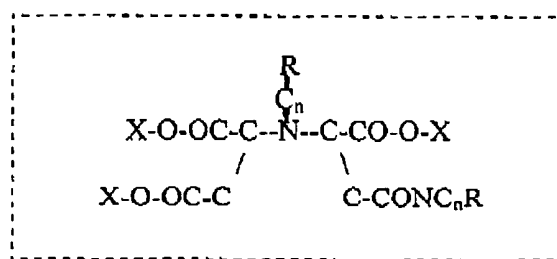


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where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts, n is 1 to 10, R is a lewis base capable of donating a nonbonded pair of electrons, and ~~Me is selected from the alkali metals,~~ and wherein the synthesis of said compound comprises the steps of:

- (a) adding an acid anhydride or lactone to a first polyfunctional amine, and allowing same to react to form a N- polyfunctional acid common name amide; and
- (b) adding to said N-polyfunctional acid common name amide, water, a second polyfunctional amine, an acid anhydride or lactone, an Me(OH), alkali metal hydroxide, and allowing same to react to form said compound.

17. (Currently amended) A compound used as a chelating agent in a concentration of $1/10^a$ to 1 part, where a is less than 10, or 1.0×10^{-9} Molar to 3 Molar, said compound comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:



where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts, n is 1 to 10, R is a lewis base capable of donating a

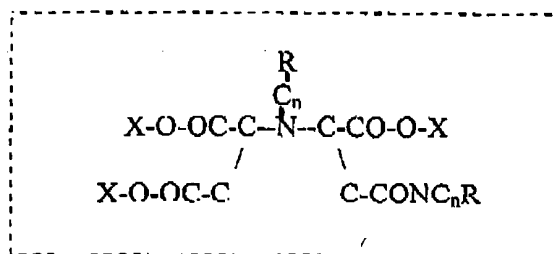
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nonbonded pair of electrons, ~~and Me is selected from the alkali metals~~, wherein the synthesis of said compound comprises the steps of:

(a) adding an acid anhydride or lactone to a first polyfunctional amine, and allowing same to react to form a N- polyfunctional acid common name amide; and

(b) adding to said N- polyfunctional acid common name amide, water, a second polyfunctional amine, an acid anhydride or lactone, ~~an Me(OH), alkali metal hydroxide~~, and allowing same to react to form said compound.

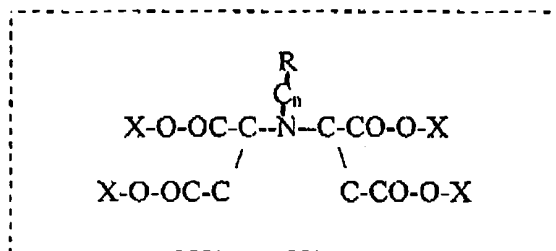
18. (Currently amended) A compound used for application to soils, seed, or plants, said compound comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:



where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts, n is 1 to 10, R is a lewis base capable of donating a nonbonded pair of electrons, ~~and Me is selected from the alkali metals~~, wherein the synthesis of said compound comprises the steps of:

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- (a) adding an acid anhydride or lactone to a first polyfunctional amine, and allowing same to react to form a N- polyfunctional acid common name amide; and
- (b) adding to said N- polyfunctional acid common name amide, water, a second polyfunctional amine, an acid anhydride or lactone, an ~~Me(OH)~~, alkali metal hydroxide, and allowing same to react to form said compound.
19. (Canceled).
20. (Currently amended) A fertilizer additive comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:

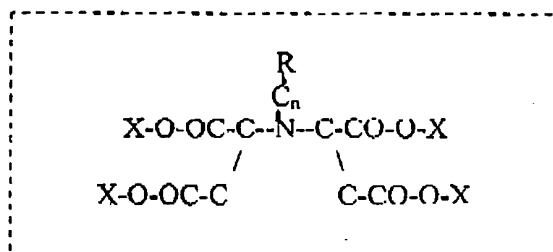


where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts, where n is 1 to 10; where R is a Lewis base capable of donating a nonbonded pair of electrons, wherein the synthesis of said fertilizer additive comprises the steps of:

adding maleic anhydride or malic acid to ~~Me(OH)~~ alkali metal hydroxide + polyfunctional amine + water, and allowing same to react to form the N, N-disuccinylamino(:functional group).

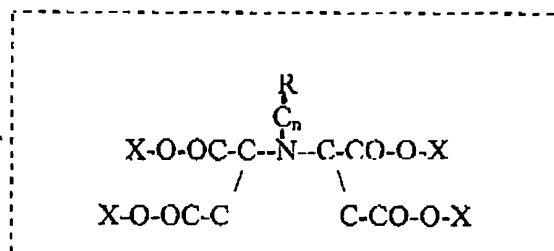
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21. (Currently amended) A chelating agent in a concentration of $1/10^3$ to 1 part, where a is less than 10, or, or 1.0×10^{-9} Molar to 3 Molar, wherein said chelating agent comprises at least one poly functional substitution on iminodisuccinic acid having the following formula:



where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts; where n is 1 to 10; where R is a Lewis base capable of donating a nonbonded pair of electrons, and wherein the synthesis of said chelating agent comprises the steps of : adding maleic anhydride or malic acid to ~~Me(OH)~~ alkali metal hydroxide + polyfunctional amine + water, and allowing same to react to form the N, N-disuccinicamino(:functional group).

22. (Currently amended) A compound used for application to soils, seed, or plants comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:

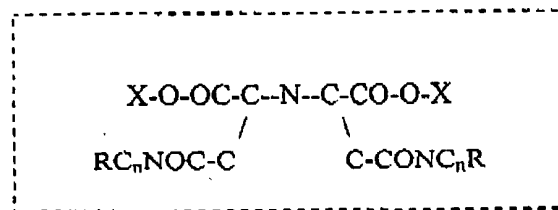


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where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts; where n is 1 to 10; where R is a Lewis base capable of donating a nonbonded pair of electrons, wherein the synthesis of said compound comprises the steps of: adding maleic anhydride or malic acid to ~~Me(OH)~~ alkali metal hydroxide + polyfunctional amine + water, and allowing same to react to form the N, N-disuccinamicamino(;;functional group).

23. (Canceled).

24. (Currently amended) A fertilizer additive comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:



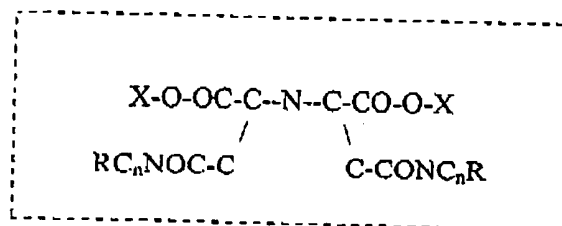
where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts; where n is 1 to 10, where R is a Lewis base capable of donating a nonbonded pair of electrons; wherein the synthesis of said fertilizer additive comprises the steps of:

(a) adding acid anhydride or lactone to a first polyfunctional amine and allowing same to react to form a N- polyfunctional acid common name amide;
 and

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(b) adding to said N- polyfunctional acid common name amide, water + ammonia + $\text{Me}(\text{OH})$, alkali metal hydroxide, and allowing same to react to form an N,N- amino polyfunctional acid common name amide.

25. (Currently amended) A chelating agent in a concentration of $1/10^8$ to 1 part, where a is less than 10, or 1.0×10^{-9} Molar to 3 Molar, said chelating agent comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:

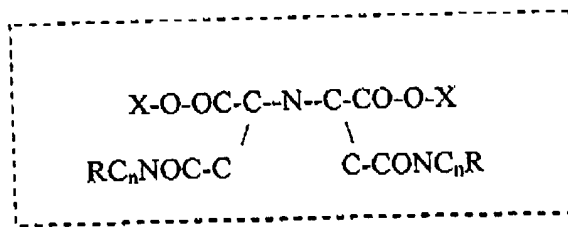


where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts; where n is 1 to 10, where R is a Lewis base capable of donating a nonbonded pair of electrons; and wherein the synthesis of said chelating agent comprises the steps of:

- (a) adding acid anhydride or lactone to a first polyfunctional amine and allowing same to react to form a N- polyfunctional acid common name amide; and
- (b) adding to said N- polyfunctional acid common name amide, water + ammonia + $\text{Me}(\text{OH})$, alkali metal hydroxide, and allowing same to react to form an N,N- amino polyfunctional acid common name amide.

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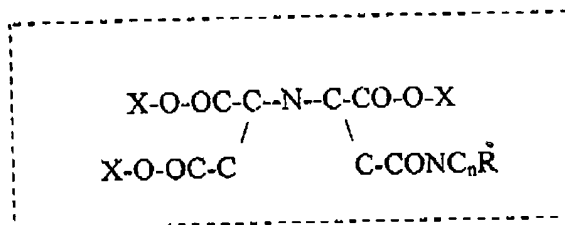
26. (Currently amended) A compound used for application to soils, seed, or plants comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:



where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salts; where n is 1 to 10, where R is a Lewis base capable of donating a nonbonded pair of electrons; and wherein the synthesis of said compound comprises the steps of : (a) adding acid anhydride or lactone to a first polyfunctional amine and allowing same to react to form a N- polyfunctional acid common name amide; and (b) adding to said N- polyfunctional acid common name amide, water + ammonia + ~~Me(OH)~~, alkali metal hydroxide, and allowing same to react to form an N,N- amino polyfunctional acid common name amide.

27. (Canceled).

28. (Previously presented) A fertilizer additive[s] comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:

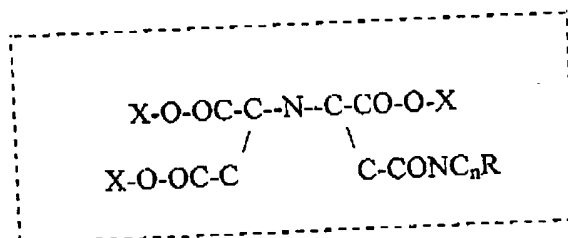


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where X may be H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal; where n may be 1 to 10; where R may be a lewis base capable of donating a nonbonded pair of electrons; wherein the synthesis of said fertilizer additive comprises the steps of:

- (a) adding an acid anhydride or lactone to a first polyfunctional amine and allowing same to react to form an N- polyfunctional acid common name amide;
- (b) adding to said N- polyfunctional acid common name amide, water, ammonia + maleic anhydride or maleic acid (salt) and allowing same to react to form said fertilizer additive.

29. (Previously presented) A chelating agent in a concentration of $1/10^a$ to 1 part, where a is less than 10, or 1.0×10^{-9} Molar to 3 Molar, said chelating agent comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:

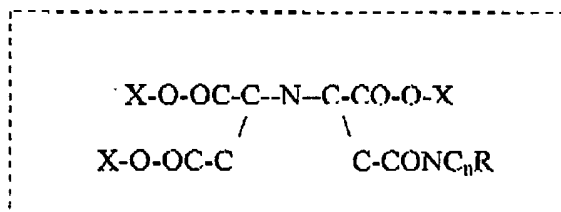


where X may be H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal; where n may be 1 to 10; where R may be a lewis base capable of donating a nonbonded pair of electrons; wherein the synthesis of said chelating agent comprises the steps of:

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- (a) adding an acid anhydride or lactone to a first polyfunctional amine and allowing same to react to form an N- polyfunctional acid common name amide;
- (b) adding to said N- polyfunctional acid common name amide, water, ammonia + maleic anhydride or maleic acid (salt) and allowing same to react to form said chelating agent.

30. (Previously presented) A compound used for application to soils, seed, or plants, said compound comprising at least one poly functional substitution on iminodisuccinic acid having the following formula:



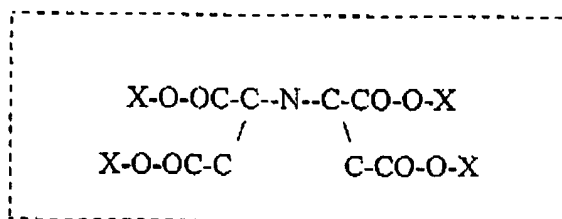
where X may be H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal; where n may be 1 to 10; where R may be a lewis base capable of donating a nonbonded pair of electrons; wherein the synthesis of said compound comprises the steps of:

- (a) adding an acid anhydride or lactone to a first polyfunctional amine and allowing same to react to form an N- polyfunctional acid common name amide;
- (b) adding to said N- polyfunctional acid common name amide, water, ammonia + maleic anhydride or maleic acid (salt) and allowing same to react to form said compound.

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31. (Canceled).

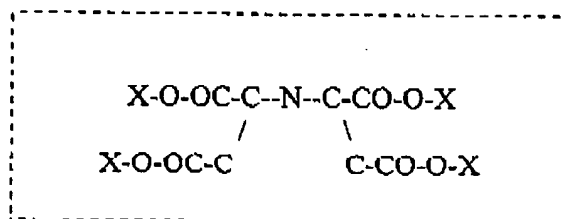
32. (Previously presented) A fertilizer additive comprising iminodisuccinic acid having the following formula:



where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salt.

33. (Canceled).

34. (Previously presented) An iminodisuccinic acid used for application to soils, seed, or plants having the following formula:



where X is H, alkali, alkaline earth, ammonium-substituted radical, ammonium or transition metal salt.

35. (Previously presented) Nonphosphate fertilizer additives comprising iminodisuccinates.